

REMARKS

Applicants have amended claim 4 to include all the limitations of claim 6 and canceled claim 6. Note that claim 3 depends from claim 4, even though it precedes claim 4. Applicants have therefore canceled claim 3 and added new claim 20, which is identical to claim 3. New claim 21 has also been added. Support for new claim 21 can be found at page 5, line 15 and Examples 2-7.¹ No new subject matter has been added by these amendments.

The amendments should be entered as they raise no new issues that will require further consideration or search and also do not touch the merits of the application within the meaning of 37 C.F.R. § 1.116(b).

Claims 4 and 7-21 are currently pending. Reconsideration of this application, as amended, is respectfully requested in view of the remarks below.

Rejection under 35 U.S.C. § 103(a)

I

Claims 3, 4, 6-9 and 11-19 are rejected as being unpatentable over Duecker (U.S. Patent 6,122,428) in combination with Szum (U.S. Patent 6,110,593). Claim 3 has been replaced by claim 20 and claim 6 has been canceled. Claims 4, 7-9, 11-14, and 20 are drawn to a resin composition. Claims 15-16 are drawn to a method of preparing a resin for manufacturing optical fiber ribbon with the resin composition of claim 4. Claims 17-19 are drawn to a resin prepared by the method of claim 15. Claim 4, the broadest resin composition claim, will be discussed first.

Claim 4 covers a resin composition including (a) a photopolymerizable urethane acrylate oligomer containing polydimethylsiloxane (PDMS), (b) a monomer, (c) a photoinitiator, (d) a leveling/defoaming agent, and (e) an antioxidant. In this composition, the urethane acrylate oligomer is synthesized from a mixture, including (i) a first polyol containing PDMS, (ii) a second polyol, (iii) a polyisocyanate, (iv) an acrylate alcohol, (v) a urethane reaction catalyst,

¹ Claim 21 depends from claim 20 and recites a second polyol being polycaprolactone diol. Support for this recitation appears at page 5, line 15 and in Examples 2-7, in which polycaprolactone diol was used as a second polyol.

and (vi) a polymerization inhibitor. The urethane acrylate oligomer thus synthesized includes four moieties: the first PDMS-containing polyol, the second polyol, the polyisocyanate, and the acrylate alcohol.² The first and second polyols are linked by the polyisocyanate to form a linear backbone, which is terminated by the acrylate alcohol moiety.³ Note that the second polyol recited in amended claim 4 is limited to polyol polyester polyol, polycarbonate polyol, polycaprolactone polyol, tetrahydrofuran propyleneoxide ring opening copolymer, ethylene glycol, propylene glycol, 1,4-butanediol, 1,5-pentanediol, 1,6-hexanediol, neopentyl glycol, 1,4-cyclohexane dimethanol, bisphenol A, bisphenol F diol, and a mixture thereof. As neither the first polyol nor the second polyol is a polyether polyol, the backbone obtained from the first and second polyols is non-polyether-based.

Duecker teaches a radiation curable composition, which comprises “a polyether-based urethane acrylate that, in a preferred embodiment, is silicon-modified , [] a monomer, a photoinitiator and a stabilizer” (the Office Action, page 4, lines 1-3, emphasis added). In this composition, the backbone of the urethane acrylate is polyether-based (see column 4, line 18) and therefore distinguished from the backbone formed in the urethane acrylate oligomer recited in claim 4.

Szum discloses a radiation curable moiety that includes a radiation curable oligomer, a reactive diluent, a photoinitiator and additives. Example 1-1 of Szum describes conventional synthesis of a PDMS-containing urethane acrylate oligomer, i.e., a reaction involving a PDMS diol, a diisocyanate, an inhibitor, and a catalyst.

Applicants submit that the obviousness rejection based on Duecker and Szum can be successfully rebutted by a narrowing of claim 4 and unexpected advantage of the claimed resin

² Although 6 limitations, (i)-(vi), are recited in claim 4, only (i)-(iv) are reactants in the reaction of making an oligomer and become components of the oligomer. In contrast, (v) and (vi) serve as a catalyst and an inhibitor, respectively, and do not become components of the oligomer.

³ The method of synthesizing urethane acrylate oligomer includes first reacting a first and second polyols with polyisocyanate to form an intermediate in which the first and the second polyols are connected by the polyisocyanate. When the reaction is complete, all –OH peaks on the IR scale have disappeared. In other words, all hydroxy groups of polyols react with isocyanate groups of the polyisocyanate, thereby adding an isocyanate group to each terminal of the intermediate. Acrylate alcohol is then added to the reaction to react with isocyanate groups at the terminals of the intermediate. The product thus formed, a urethane acrylate oligomer, is terminated by acrylate alcohol moiety.

shown in Mr. Se Lee Chang's Declaration ("the Declaration") filed on August 7, 2003. For the Examiner's convenience, a copy of the Declaration is provided herewith.

In the Office Action dated October 28, 2003, the Examiner contended that the Declaration was unpersuasive since "the claim 4 recitation 'a second polyol compound' is not considered to distinguish the instantly claimed composition having significantly different properties from the prior art compositions." See page 2, lines 12-19. Clearly, it is the Examiner's position that the polyol in the Duecker composition and the second polyol in the composition of claim 4 can be both polyether polyol. Applicants have amended claim 4 to exclude ployether polyol. Thus, the composition of claim 4 is distinguishable from the Duecker composition.⁴

Applicants submit that the obviousness rejection based on Duecker and Szum can further be overcome by the unexpected results shown in the Declaration. Tables 1-3 of the Declaration show that 7 resins of this invention had smaller friction forces, smaller surface tensions, higher tensile strengths, and lower shrinkages than the resin prepared from EBECRYL 4842 (a polyether urethane acrylate oligomer disclosed in Duecker, the primary reference). Of note, it is preferred that resins for manufacturing optical fiber ribbon have smaller friction forces, smaller surface tensions, higher tensile strengths, and lower shrinkages so as to minimize optical loss. See page 1, lines 15-18. Further, Table 4 of the Declaration shows that the 7 resins were transparent and remained homogenous for more than 48 hours, while two resins consisting of H-I-Hsi2111-I-M (a composite oligomer disclosed in Szum, the secondary reference) were hazy and became heterogeneous within 3 hours. In view of these unexpected advantages, claim 4 is clearly not rendered obvious by Duecker and Szum.

For the same reasons set forth above, claims 7-9 and 11-20, each reciting the resin composition of claim 4, are also nonobvious over Duecker and Szum.

⁴ As discussed above, the urethane acrylate in the composition of amended claim 4 has a non-polyether-based backbone and the Duecker composition contains a polyehter-based backbone.

II

Claims 3, 4, and 7-19 are rejected as being unpatentable over Duecker in view of Shustack (U.S. Patent 5,908,873), and further in view of Ohtaka (U.S. Patent 5,787,218). Again, claim 3 has been replaced by claim 20. Claim 4, the broadest resin composition claim, will be discussed first.

Duecker has been discussed above.

Shustack teaches a radiation curable composition including an aliphatic urethane acrylate oligomer (such as silicone-modified EBECRYL4842), a reactive monomer, a release agent, a photoinitiator and an antioxidant. Shustack also teaches a urethane catalyst for preparation of analogous silicone-modified urethane acrylate.

Ohtaka teaches a liquid curable resin composition including a urethane acrylate, a polymerizable mono-functional vinyl monomer, and a polymerization initiator. The urethane acrylate is synthesized from a polyol, a diisocyanate, and a (meth)acrylate.

The Examiner's obviousness rejection based on these three references can be again successfully rebutted by a narrowing of claim 4 and a showing of unexpected advantages of the claimed resin over Duecker, the primary reference. See Tables 1-3 of the Declaration and the discussion above. Given these unexpected advantages, claim 4, as well as claims 7-20, is clearly not rendered obvious by Duecker in view of Shustack and Ohtaka.

For the reasons set forth above, new claim 21, depending from claim 4, is also nonobvious over the cited prior art references.

CONCLUSION

For the reasons set forth above, Applicants submit that the grounds for the rejections asserted by the Examiner have been overcome, and that claims 4 and 7-21, as pending, define subject matter that is nonobvious over the prior art. Applicants ask that all claims be allowed.

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Respectfully submitted,

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Y. Rocky Tsao
Y. Rocky Tsao, Ph.D., J.D.
Attorney for Applicants
Reg. No. 34,053

Fish & Richardson P.C.
225 Franklin Street
Boston, MA 02110-2804
Telephone: (617) 542-5070
Facsimile: (617) 542-8906

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